Complexity in the European party space: Exploring dimensionality with experts

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Abstract

Does the *n*-issue space in domestic European polities reduce to one, two, or more dimensions? How do these dimensions relate to each other? More broadly, how does dimensionality vary across countries? We attempt to advance our understanding of political contestation in Europe by mapping the dimensionality of the political space across 24 countries using Chapel Hill expert survey (CHES) data. We test how well different models of the European political space fit the CHES data and find that three-dimensional models best fit the data in all countries. However, there is considerable cross-national variation in how the three dimensions relate to one another. Given this, we present a new measure of dimensional complexity that captures the degree to which these three dimensions are related. In so doing, we improve our understanding of the complexity of the political space in European countries.

Introduction

In this article we use expert survey data on the positioning of political parties to investigate the dimensionality of the political space across 24 countries in the

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European Union (EU). The relative dimensionality of a given party space, or what Lijphart (1999: 87) refers to as the 'number of issue dimensions of party systems', has serious implications for the strategic considerations of political parties and voters in both domestic and supra national arenas. Hix et al. (2006: 494) argue in their study of the dimensionality of European Parliament politics that '[o]ne of the main ways of understanding politics inside legislative institutions is to investigate the shape of the policy space'. Further, a 2010 special issue of *West European Politics* (Volume 33, No. 3) focusing on cleavages illustrates that understanding the shape of the policy space in the electoral arena remains a vibrant avenue of contemporary research as well.

For the growing number of researchers interested in spatial models of party competition and voting behaviour, multi-dimensionality, where more than one axis of political contestation is relevant, fundamentally changes the dynamics and strategies of politics, necessarily altering our approach to modelling various aspects of political behaviour in the process (see Benoit and Laver, 2006). As the link between citizens and government, political parties aggregate and articulate the interests of society, recruit members to stand for elected office and mobilize the electorate to vote. Parties and citizens functioning in a high-dimensionality environment may participate in these and other essential political activities in systematically different ways than parties and citizens in an environment of lower dimensionality. Also, recent research suggests that higher levels of effective dimensionality are associated with more fragmentation of the party system (Stoll, 2010), further altering the political landscape.

As Stoll (2011) suggests, the way researchers conceptualize dimensionality matters. In this article, we present evidence that three distinct dimensions are present in most European countries, but that, crucially, the relationship of these dimensions to one another varies substantially from country to country. We therefore present a new measure of dimensional complexity for a given political space that characterizes the relationship between dimensions. This measure of dimensional complexity will help students of European politics gain a firmer grasp of this important but difficult to operationalize concept.

The nature and extent of dimensionality in political competition in Western Europe has been probed previously with the Comparative Manifesto Project (CMP) (Gabel and Huber, 2000; Budge et al., 2001; Gabel and Hix, 2002; Volkens et al., 2006; Albright, 2010; Stoll, 2010), several expert surveys on party placement (Hunt and Laver, 1992; Benoit and Laver, 2006), and in public opinion over time (Stimson et al., 2012). Although studies such as these explore the consequences of reducing complex political contestation to one axis, we agree that, '[s]urprisingly, very little work exists that attempts to document just how much information is lost' (Albright, 2010: 700).

The present article represents an attempt to advance our understanding of political contestation in Europe by mapping the dimensionality of the political space using Chapel Hill expert survey (CHES) data. This survey is designed to uncover three potentially distinct dimensions of political contestation that we have

strong prior reason to believe are relevant in this set of countries (cf. Lipset and Rokkan, 1967; Inglehart, 1977, 1990; Kitschelt, 1994; Lijphart, 1999; Hooghe et al., 2002; Hooghe and Marks, 2009). These are the traditional economic left/right dimension, the social left/right dimension,[1] and the pro-/anti-European integration dimension. The relationships between these dimensions, and the specific policies that underlie them, need further exploration and in this article we suggest that more detailed analysis of the degree to which, and how, these dimensions are interrelated with one another enhances our understanding of the party systems of Europe.

As Poole and Rosenthal (1997: 3) elegantly state, 'any science of politics must seek to find simple structures that organize this apparent complexity.' In certain contexts, empirical political scientists may be able to explain political phenomena with a single dimension as well as they could with two dimensions. Given the small *N* issues in studying cross-national European politics, this potential gain in parsimony would be even more valuable. We share an interest with Benoit and Laver (2012) in knowing 'how many latent dimensions of political difference do we need to describe and analyze the political problem at hand without destroying "too much" information?' Using expert placement's of parties on a variety of issues measured by the CHES questions, we analyse the relationships between three important dimensions in contemporary European politics.

Using confirmatory factor analysis (CFA), we test whether one-, two-, or three-factor solutions better fit the expert survey data. Since the CHES data project was designed to measure party positions on three dimensions and we use CFA in our analysis, the approach of the present article falls into the category of deductive research on dimensionality outlined by De Vries and Marks (2012). In all countries, a three-factor solution fits best; however, the difference in the improvement in model fit gained from going from one to three factors varies dramatically by country. In Spain, going from one- to two- to three-factor solutions barely improves the model fit. In contrast, in Finland, the three-factor model far outperforms the one-factor model. In other words, according to the placements of experts polled in the CHES, the dimensional space of Europe is much more complex in some environments than in others.

The article proceeds as follows. First, we discuss the literature on dimensionality in Europe and introduce the CHES. Second, we analyse the number of dimensions and the relationship between them in each European state included in the survey using the 2006 CHES data. Using CFA we estimate factors for the economic left/right, social left/right, and EU dimensions. Using these factors, we then assess the correlations between them. While the three-dimensional solution best fits the CHES data in all of the countries, not all three-dimensional solutions are the same. In some countries, the three latent dimensions are highly interrelated relative to other countries. We argue that the pattern of correlations among these latent dimensions reflects the complexity of the dimensional space in the party systems. The patterns of dimensional complexity do not lend themselves to standard explanations (East vs. West, party system structure, etc.). Thus, we discuss future extensions to this research to fully explore these patterns.

Dimensionality in Europe

Theoretically, politics can be conceived as contestation in an infinite-issue space. However, for many reasons, there is justification for reducing that space to a more manageable number. For voters, the limits of cognition, or capacity, to process information, constrain the number of dimensions (Downs, 1957; Kitschelt, 1994; Hinich and Munger, 1996). Downs (1957) cogently argues that voters use ideology to cut their information cost and choose their preferred political party or candidate.

For parties, reducing the information costs for voters helps resolve an essential collective action problem for candidates, namely mobilizing the electorate to vote (Aldrich, 1995). As Layman and Carsey (2002: 788) argue:

> 'When Democratic and Republican elites present distinct viewpoints on multiple issues, those issues are, to some extent, packaged together for public consumption. In other words, the policy positions of the two parties help determine "what goes with what" in public policy debates and in the policy attitudes of citizens who receive political cues from party elites.'

Further, in a multiparty system, this elite capacity to determine 'what goes with what' or even whether issues are on the agenda is a crucial explanation for the (lack of) success of new parties (Meguid, 2008).

Finally, for researchers, this process of data reduction, or going from an n-dimensional space to a simple one- or two-dimensional space, greatly simplifies analysis, with little loss of explanatory power. In the United States, for instance, Poole and Rosenthal (1997: 19) find that explaining roll call votes requires one or, at most, two dimensions. In their words, 'virtually no substantive concern is served by going beyond two dimensions' (Poole and Rosenthal, 1997: 19).

In American politics, largely thanks to Poole and Rosenthal (1997), a simple one-dimensional ideological space is the default.[2] But is a single economic left/right dimension enough to explain political contestation in multi-party systems in Europe?

Using social structure as the theoretical basis, Kitschelt (1994) divides the issue space into two dimensions: socialist vs. capitalist and libertarian vs. authoritarian. Similarly, Marks et al. (2006) contend that two dimensions structure political competition, an economic left/right and a second, more context-specific, dimension that captures several non-economic issues such as the environment, lifestyle, and community, which they label GAL/TAN.

To be perceived as responsible and reliable to voters, parties must package together an ideology that is relatively coherent and stable (Downs, 1957: 109). Thus, although two theoretical dimensions exist, Western European parties actually compete along a single left-libertarian/right-authoritarian dimension while the off-diagonal quadrants, extreme socialist-authoritarian and capitalist-libertarian regions, are empirically empty in the West (Kitschelt, 1994: 24–26).

As Marks et al. (2006: 157–158) illustrate with correlations and scatterplots, the two-dimensional space neatly reduces to a single dimension in both the West and the East, though the single unifying dimension shifts from left-libertarian/right-authoritarian in the West to left-authoritarian/right-libertarian in the East (Marks et al., 2006). These studies cast some doubt on the orthogonality of a second latent dimension.

In contrast to this simpler one-dimensional space, other scholars find more variation in the dimensionality of European political systems. For instance, Schofield (1993a) uses the CMP data to map two dimensions from the issue space. Indeed, he is startled to discover that the issue space so neatly reduces to two dimensions (Schofield, 1993a: 30) and finds both dimensions valuable for analysing coalition formation. Theoretically, Schofield (1993b: 136) argues that, for coalition bargaining, a one-dimensional model is unsatisfactory. Counterfactually, he infers that since smaller parties never form the core position in minority coalitions, then '...there must be more than one underlying dimension of policy or ideology in these countries' (Schofield, 1993b: 143). And yet, Schofield only finds empirical evidence for two dimensions in 6 of the 12 Western European countries studied.

More recently, Stoll (2010) used CMP data to extract the number of latent dimensions in the issue space. Given her focus on the realignment debate, she pools the data across 18 Western European countries and compares the number of dimensions over time. The principal component analysis shows that dimensionality has decreased over the post-war era, going from three dimensions in the 1950s to one or two in the 1990s and 2000s (Stoll, 2010: 461). Further, the simplification of the issue space is not restricted to elites. Analysing the European Values Survey, Henjak (2010) also finds that two dimensions structure individual attitudes generally, but the strength and content of the second dimension varies considerably across countries. While the temporal variation is interesting and warrants further investigation, we argue below that we should not ignore the variation in dimensionality between countries.

Again, the value of this distinction between *n* dimensions and a single or two is crucial for researchers. Equipped with a citizen's position on just a single or few dimensions, researchers are able to relatively accurately predict voter attitudes on all issues (Hinich and Munger, 1996: 127). Hinich and Munger (1996: 3) go further, arguing that

> 'the cleavages between parties separate along simpler, more predictable lines than an *n*-dimensional policy space would imply, *even if what voters care about is the n-dimensional space*. A reduced-dimensional policy space represents party conflict very accurately, and at far less cost to the voters and the parties themselves'.

In their unified theory of party competition, for instance, Adams et al. (2005) make significant progress in explaining party positioning in response to voters using a simple left/right dimension.[3]

A further complicating factor is that political contestation in Europe takes place amidst the ongoing process of European integration. The degree to which

European integration forms a separate dimension of political contestation, independent of domestic politics, and its proper conception remains a contested question in European political research. Following Steenbergen and Marks (2004), we recognize at least three separate models of how a potential European dimension relates to the classic left/right dimension of domestic politics.

Hix and Lord (1997) call into question the premise of unidimensional competition on the issue of Europe (cf. Hix, 1999a, 1999b). Since the pioneering work of Lipset and Rokkan (1967), it is widely recognized that the traditional, major political parties are accustomed to and best suited for competition along the existing left/right dimension. These parties therefore attempt to frame European politics according to left/right competition as much as possible, but these parties are internally divided on national sovereignty, which creates an independent continuum of competition surrounding questions of more national independence versus more integration. The independence/integration dimension mobilizes territorial groups while the left/right dimension does the same for functional groups. The cross-cutting nature of these coalitions undermines our ability to collapse these dimensions of conflict into one new dimension of contestation (Hix, 1999a).

Hooghe and Marks (1999, 2001) also conceive of two dimensions in EU politics, one left/right with social democracy to the left and market liberalism on the right, and an integration dimension ranging from nationalism to supranationalism. For Hooghe and Marks, some aspects of European integration will be subsumed in the left/right dimension, making it appear unidimensional. Other facets of integration, however, bring forth a pro-/anti-integration dimension distinct from left/right requiring the introduction of a two-dimensional model of the EU space.

Others are less convinced that European integration necessarily makes up an independent dimension of competition at all, suggesting that European politics, too, is best understood by means of the left/right dimension (Tsebelis and Garrett, 2000). Pointing to the salience of domestic political considerations in elections to the European Parliament (see, for example, Reif and Schmitt, 1980) as well as the importance of other domestic actors and institutions in the politics of the EU, proponents of this approach argue that conventional left/right competition often captures the nature of EU politics (Kreppel and Tsebelis, 1999), and that the left generally favours more common regulation across Europe, while the right favours less EU regulation (Tsebelis and Garrett, 2000).

The rejection of an EU constitution in 2005 by Dutch and French referendum voters and the subsequent complications with passing the referendum on the Lisbon Treaty in Ireland illustrate what Hooghe and Marks (2009) characterize as a shift in public opinion on the EU from 'permissive consensus' to 'constraining dissensus'. No longer content to sit on the sidelines of what has historically been an elite-driven process, the citizens of Europe now call for more voice in questions of integration. As the salience of European politics continues to grow for the population at large, it becomes increasingly important to consider the possibility of European politics, perhaps as an independent dimension (or two), structuring domestic politics (see, for example, De Vries, 2007). In an attempt to resolve

these theoretical debates, we seek to uncover whether there is a unique European dimension in different national contexts.

This discussion clearly points to the research queries at the heart of this paper. Does the *n*-issue space in domestic European polities reduce to one, two, or more dimensions? How do these dimensions relate to each other? More broadly, how does the dimensionality vary across countries?

Briefly, we consider the following possibilities:

(i) The dimensional environment is simple, and, as suggested by Kreppel and Tsebelis (1999) and Tsebelis and Garrett (2000), the politics of European integration and social politics are contained within one overarching dimension. Here, the left/right dimension would serve as the dimension that bundles the disparate salient issues of a given society, and a single dimension is able to account for the covariation in the policy positions of parties (Pierce, 1999).

(ii) There could also be a two-dimensional environment in which there are two independent factors with specific substantive meaning. In this situation, economic left/right and social left/right reduce to a single dimension as described by Kitschelt (1994: 24–26) and Marks et al. (2006: 157–158), but the EU remains a distinct dimension as suggested by Hix and Lord (1997) and Hix (1999a).

(iii) A natural extension of the scenario described in (ii) above is the possibility that all three of these dimensions (econ left/right, EU, social left/right) are distinct from one another. In this scenario, these dimensions may still be differently related to each other across national contexts.[4]

These three models offer competing views of the dimensional space in European countries. In the following sections, we evaluate how well each model fits the CHES data. Further, we will evaluate whether and how the dimensions are interrelated.

The Chapel Hill expert survey

The CHES measures party positioning on European integration, ideology, and policy issues for national parties in a variety of European countries. The first survey was conducted in 1996, then repeated in 1999, 2002, 2006, with the most recent wave sent into the field in late 2010. The number of countries increased from 14 Western European countries in 1999 to 24 current or prospective EU members in 2006 and beyond. The number of national parties increased from 143 to 227 (Steenbergen and Marks, 2007; Hooghe et al., 2010).

Every wave of the survey contains questions on how the parties position themselves on European integration, several EU policies, the general left/right, the economic left/right and the social left/right scales. The range of policy questions within the CHES data, as well as the geographic and temporal scope of the surveys, makes the CHES data ideal for investigating the dimensionality of party spaces across a wide range of European countries. Compared to the CMP data and expert

surveys of Hunt and Laver (1992) and Benoit and Laver (2006) relatively little work has been done to map and define the dimensional space of CHES data. The present article is designed to address this lacuna.

Although the precise nature of the CHES data's dimensional space is under-explored, previous research has shown the CHES data to be a valid and reliable source of party position measurement relative to other available sources of such data. The standard deviations of expert scores reported by the CHES team are relatively small and structured in a predictable manner (see Steenbergen and Marks, 2007: 351–354; Hooghe et al., 2010: 693), which suggests that experts are not basing their assessments on different foundations (Steenbergen and Marks, 2007: 351) nor lack adequate information on which to make a judgment (Hooghe et al., 2010: 693). The data has also been cross-validated with several other data sources: party manifestos, public opinion, surveys of MPs and MEPs, and other expert surveys (Ray, 1999; Marks et al., 2007; Whitefield et al., 2007; Netjes and Binnema, 2007; Hooghe et al., 2010); this research finds that CHES judgments either correlate highly with other measures (Steenbergen and Marks, 2007; Netjes and Binnema, 2007), or indicates that expert surveys are more consistent with the evaluations of voters and parliamentarians than data currently available from party manifestos (Marks et al., 2007). The results of these and other analyses show CHES data to be a 'valid and reliable source of information on party positioning on European integration and ideological positioning' (Hooghe et al., 2010: 699).

The relatively extensive time period of the CMP understandably contributes to its widespread use in the analysis of party positioning, but there are several aspects of the CHES placements that overcome potential limitations in the CMP data when analysing the dimensionality of the European political space. Manifestos are strategic documents that do not necessarily cover all relevant policy issues. They only provide information on a party's position at the time prior to the election and the manifestos depict a political party as a unified whole, shedding little light on intra-party dissent (Marks et al., 2007). To be clear, we do not intend to suggest that the questions of the CHES catalogue exhaustively cover the scope of actual party competition in Europe. Rather we stress that the range of policies investigated by CHES make it well suited to comparisons of dimensional complexity. And while it is true that this survey measures expert evaluations of dimensionality in European party politics rather than the dimensionality of party competition itself, the battery of 18 issue-specific questions presented to CHES experts are designed to capture a number of potentially salient dimensions and are informed by prior scholarship on party competition in Europe (Lipset and Rokkan, 1967; Inglehart, 1977, 1990; Kitschelt, 1994; Lijphart, 1999; Hooghe et al., 2002; Hooghe and Marks, 2009). In particular, the CHES incorporates most of the questions that were used for European countries in Benoit and Laver's 47 country expert survey from 2002–2003 (Benoit and Laver, 2006, 2007). Built on the work of a previous expert survey by Hunt and Laver (1992), this survey included a variety of specific policy questions for European countries recommended by local specialists in pre-survey questionnaires.

Public opinion data has also been used to explore dimensionality (e.g. Stimson et al., 2012); however, while national election studies are increasingly common in more countries, cross-national comparisons can be difficult given differences in questions. More importantly for our study, there are no public opinion surveys that ask respondents to place as many parties on as many policy issues as the CHES. For these reasons, public opinion data are not as useful as expert survey data for our research purposes. Here again, the large number of parties and policy questions included in the CHES make it the most useful data source for investigating the relative complexity of dimensional space for European political parties.

Plotting the dimensional space

In the 2006 CHES, experts place parties on an economic left/right dimension, a social left/right dimension, and an EU integration dimension. However, the experts also place parties on 18 specific policies/issues, such as decentralization, minority rights, welfare, etc.[5] Thus, there are a variety of methods to extract dimensions from the data, for example using the expert placements on the three dimension-specific questions or using factor analysis on the 18 issues to test whether one, two, or more dimensions best fit the data. In the following pages, we analyse the parties using both methods.

To better understand the data, we first created scatterplots with the expert evaluations of the two left/right dimensions. For example, in Figure 1, we present the Spanish, Slovakian, and Hungarian party systems.

For illustration purposes, the graphs include a best-fit line. As Figure 1(a) shows, in the Spanish case, the relationship between economic and social left/right is so strong and positive that it is reasonable to assert that the experts place Spanish parties on what is essentially a single left-libertarian/right-authoritarian dimension. The contrast between Spain and Hungary, shown in Figure 1(c), is striking. In the CHES data, the parties in Hungary fall along a single dimension, although in Hungary it is left-authoritarian/right-libertarian. Finally, Figure 1(b) demonstrates a case within the CHES data where there is no a discernible relationship between economic and social left/right among the parties of a country. Extreme economic left- and right-wing parties are just as likely to be on the social right side, while centrist parties occupy both sides of the social spectrum.

These examples highlight the three main patterns in the data. In the appendix, we present graphs of the remaining countries. But the correlation coefficients tell much of the story. Table 1 presents the correlations between the expert evaluations of economic left/right, social left/right, and the EU, by country.

As previous research has demonstrated (Marks et al., 2006), the relationship is positive in the West (left-wing parties are also left on social left/right), but the evidence in the East is mixed. In some countries, such as Bulgaria and Hungary, the economic left-wing parties are the social right-wing parties while other Eastern European countries, such as Latvia and Slovenia, mimic the Western relationship.
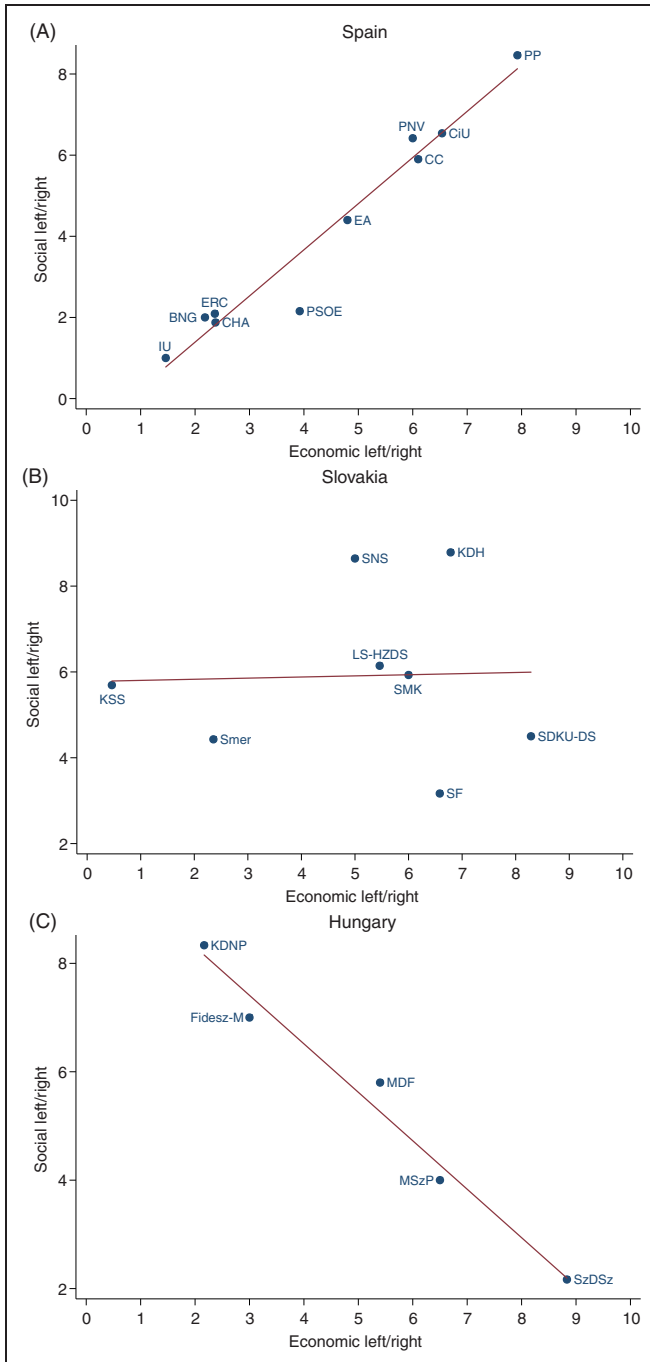
Figure 1. Political parties in a two-dimensional space.

Table 1. Economic left/right, social left/right, and EU correlation coefficients

Country	Correlation coefficients			Observations (parties)
	Economic and social left/right	Economic left/right and EU	Social left/right and EU	
Austria	0.25	−0.07	−0.57	40 (7)
Belgium	0.55	−0.01	−0.31	71 (10)
Bulgaria	−0.45	0.32	−0.57	81 (7)
Czech	−0.51	0.24	−0.38	49 (7)
Denmark	0.45	0.53	−0.11	72 (9)
Estonia	0.33	0.55	0.17	30 (6)
Finland	0.17	0.16	−0.45	88 (8)
France	0.69	−0.04	−0.50	71 (8)
Germany	−0.21	0.06	0.11	66 (6)
Greece	0.30	0.62	−0.27	60 (6)
Hungary	−0.88	0.70	−0.68	29 (5)
Ireland	0.49	0.66	0.53	60 (6)
Italy	0.53	0.02	−0.14	128 (17)
Latvia	0.26	0.42	−0.05	36 (9)
Lithuania	−0.40	0.40	−0.31	56 (8)
Netherlands	0.30	0.02	−0.49	96 (8)
Poland	−0.74	0.81	−0.86	55 (8)
Portugal	0.90	0.57	0.43	50 (5)
Romania	−0.62	0.53	−0.71	67 (6)
Slovakia	0.04	0.51	−0.34	109 (8)
Slovenia	0.65	0.08	−0.08	42 (8)
Spain	0.88	0.28	0.20	123 (10)
Sweden	0.50	0.65	0.36	80 (8)
UK	0.73	−0.63	−0.67	63 (7)

Note: Observations equal the individual expert evaluations of each party (i.e. for each country, if there are 7 experts evaluating 7 parties, then there are 49 observations).

In only a few countries is the correlation less than 0.50. Slovakia is an extreme outlier, with nearly no correlation between the two dimensions at all.

These correlations suggest that, based on expert placement on the two dimensions, parties typically compete along a single dominant dimension. Yet, in some cases, such as Slovakia, the party system clearly displays more than one dimension.

While the table offers a useful starting point, it obscures some interesting trends. In Figure 2, we visualize these correlations in a series of simple bar graphs so as to better compare the patterns in the correlations.

Figure 2 makes clear the dramatic variation across countries. Most of the correlations in Figure 2(a) are positive and reasonably strong, showing that economic left-wing parties tend to also be left on the social dimension. Only a few correlations are small, or even near zero in the case of Slovakia, which suggests there is little to no relationship between the two dimensions. In the remaining few cases, the correlations are negative, as in Hungary, where economic left-wing parties tend to be right-wing on the social dimension.

Figure 2(b) illustrates the correlations between economic left/right and the EU. While for many countries, the correlations are positive and strong (e.g. economic right-wing parties are pro-Europe), the correlation is negligible in several countries, especially in the original EU 6. Only in the UK is the relationship notably reversed, so that left-wing parties tend to also be pro-Europe.

Finally, Figure 2(c) offers even more variation to explain. As expected, more social-right parties are anti-Europe; however, in several countries, the relationship is reversed. What this simple analysis of correlation patterns illustrates, though, is that the relationships between the dimensions vary, often dramatically, by country. And yet, while these correlations tell some of the story, they are not sufficient for understanding the factor structure in the data. In the next section, we set aside the expert placements on the direct dimensional questions (economic, social left/right, and EU) and focus on specific issues in an effort to extract dimensions.

Analysing the latent dimensions

Hinich and Munger (1996: 102) argue that 'the units of the space, and its dimensionality, *are not theoretically derivable*. The dimensions are, at best, empirically recoverable, using regression analysis or factor analysis'. In this section, we attempt to recover the dimensions by analysing the issue space to determine the number of dimensions and, more importantly, the relationship between them in each system.

At this stage, we set aside the expert responses to the direct questions regarding placement on the dimensions (i.e. where experts place parties on the economic left/right scale) and focus on expert placement of parties on specific issues (i.e. where experts place parties on redistribution, immigration, EU foreign policy, etc.). Prior research has uncovered meaningful variation in the dimensionality of party politics across EU member states (Bakker et al., 2008; Benoit and Laver, 2007). We therefore disaggregate to a country-level analysis. Using 18 policy-specific questions in the CHES, we conduct country-specific CFAs to assess whether a one-, two-, or three-factor model best fits the data. We then evaluate how interrelated the dimensions are to advance our understanding of the political spaces. In doing so, we move from a simple estimate of the number of relevant dimensions to a measure of the complexity of the dimensional space.

As discussed above, we are specifically interested in the relationships between economic left/right, social left/right, and European integration as these are three dominant dimensions present in the literature on European politics. We do not assert that these are the only dimensions making up the political spaces of Europe,
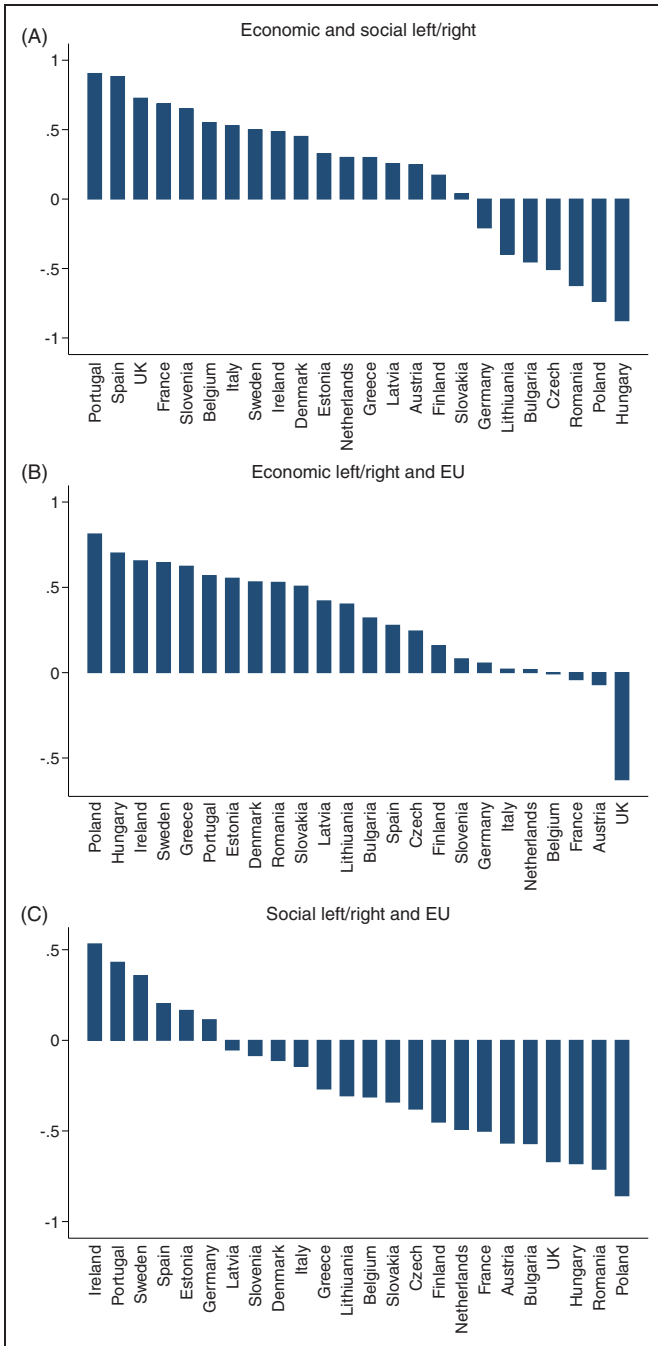
Figure 2. Left/right and EU correlation coefficients.

but given their importance in both academic research and political reality, we believe they merit close investigation. As described earlier, previous research on the relationships between these dimensions yields conflicting results. The hypothesized relationships between economic and social left/right range from near-perfect positive correlation to near-perfect negative correlation (Marks et al., 2006). Each of these dimensions' relationships to the EU integration issue also varies in the theoretical literature (Marks and Steenbergen, 2004).

Given data on parties' positions on these issue areas available in the CHES, we can directly test these different hypotheses. Although there are a wide range of hypothetical models to test, we focus on three broad types of political spaces and test which of these models best fits the data on party positioning collected from the CHES. Specifically, we test whether parties' positions on economic left/right, social left/right, and EU integration can be reduced to a single dimension, a single left/right dimension, and an EU dimension, or whether the three dimensions exist distinctly from each other. We further evaluate how distinct these dimensions are from each other, to more fully understand the dimensional complexity across countries.

We have theoretically informed reason to believe that some subsets of the policy questions are related to one another, and the survey was written with this over-arching model of dimensionality in mind. The CHES was not created to measure unconstrained dimensionality within countries, but as an instrument for testing the existence of three dimensions prominent in the literature on the policy space in Europe. Owing to this survey design, CFA is a useful test of the survey's ability to uncover these dimensions (see Benoit and Laver, 2012).[6]

Given that we have an *a priori* model of dimensionality inherent in the construction of the survey, we estimate country-specific CFAs using 18 policy-specific questions from the survey. We specify the economic left/right, social left/right, and EU dimensions to be causally connected to specific subsets of these indicators (see the online appendix for a list of the policy questions, grouped under economic left/right, social left/right, and European integration). In the models with more than one factor, we allow the factors to be correlated. The indicators are measured on 7- or 11-point scales making the assumption of continuously measured indicators reasonable.[7] The number of parties in these analyses ranges from 5 in Portugal to 17 in Italy with the total number of observations (expert placements of parties) ranging from 29 in Hungary to 128 in Italy.

Following Kolenikov (2009), the CFA models take the following general form:

$$y_{ij} = \mu_j + \sum_{k=1}^{m} \lambda_{jk} \xi_{ik} + \delta_{ij}, \quad j = 1, \ldots, p \tag{1}$$

where i indexes the observation, j indexes the observed indicator, k indexes the latent factor, and p_k is the number of observed indicators associated with each of the latent factors. The y_{ij} represent observation i's placement of a party on indicator j, λ_{jk} is the

factor loading relating indicator j to factor k and the μ_j are the intercepts. The ξ_{ik} are the latent factors and the δ_{ij} are measurement, or unique, errors.

Before moving to estimation, we must assess the identification of these models. First, we set the scale of the latent variables to have mean 0 and variance 1. Next, we compare the number of parameters to be estimated to the degrees of freedom of the models. The degrees of freedom must equal or exceed the number of parameters for identification to hold. In our models, we have 18 observed indicators which correspond to 54 free parameters in the single factor model. That is, there are 18 * 3 parameters in the model: $18 * \mu + 18 * \lambda + 18 * \delta$. In the two- and three-factor models, an additional one and two parameters, respectively, need to be estimated in order to account for the correlations between the factors. The degrees of freedom equals the number of non-redundant elements in the variance/covariance matrix of the observed indicators, which is given by

$$DF = \frac{p(p+1)}{2}, \tag{2}$$

where p is the number of observed indicators. Given 18 indicators, this yields 171 degrees of freedom, thus satisfying this necessary condition for identification. Further, following Bollen (1989), these models meet sufficient conditions for identification with the *three indicators rule*. This rule states that if each latent factor has at least three observed indicators, the covariances of the errors of the observed indicators are zero and there are no cross-loadings (each observed indicator is related to one and only one latent factor), then the model is identified. Our models meet these requirements and, thus, are identified. We estimated the models via maximum likelihood using the M*plus* software (Muthén and Muthén, 2008).

Following Benoit and Laver (2012), we are concerned with balancing parsimony against throwing away too much information. One means of assessing the degree to which reducing the space from three to fewer dimensions is reasonable is to compare the fit of the models estimating differing numbers of factors. For every country, a three-factor solution (economic left/right, social left/right, and EU) fits better than a one- or two-factor solution, suggesting that each of the three dimensions can be isolated from one another in a meaningful way. For the model with a single factor, we combine all 18 indicators into one dimension. In no case did a one-factor solution fit better than either a two- or three-factor solution. When estimating the two-factor models, we combine the three economic left/right and the nine social left/right indicators into a single left/right factor and keep the five indicators for the EU dimension separate. Figure 3 displays the changes in the comparative fit index (CFI) values when moving from a two-factor to a three-factor solution. Larger values of CFI indicate better fitting models; larger changes suggest a bigger improvement going from two to three factors.

The results confirm that expert placements of parties on the economic left/right, social left/right, and EU dimensions are distinct from one another, albeit to varying
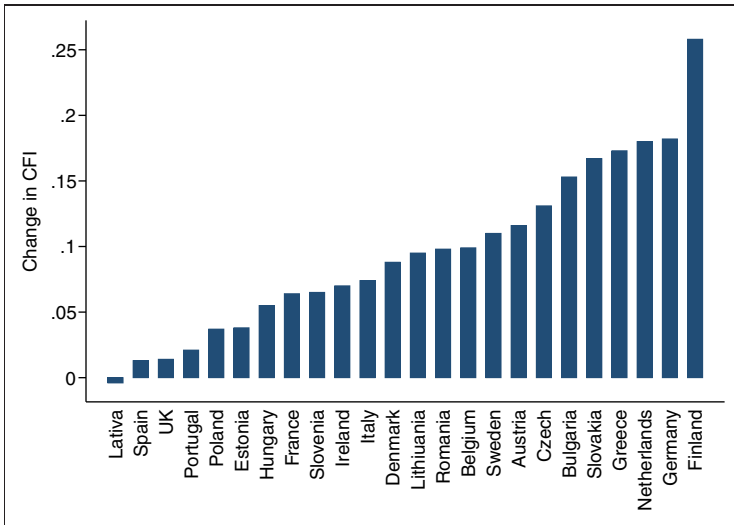
Figure 3. Change in CFI moving from two to three factor solutions.

degrees. The greater the improvement in fit moving from one to two to three factors, the more distinct these dimensions are from one another.

Given that the models with one and two factors are nested in the model with three factors, we can also compare the model fit using the Akaike information criterion (AIC) and the Bayesian information criterion (BIC). For both of these measures, models with lower values of AIC or BIC fit the data better than models with higher values. Table 2 presents these two measures across the three different models for each country. In all cases, both the AIC and the BIC favour a three-factor solution over either a one- or two-factor solution. We also conducted like-lihood ratio tests between the one-, two-, and three-factor models and, with the exception of Latvia, the improvement in fit moving to a three-factor solution is statistically significant in all countries. In Table 2, we display the BIC and AIC measures for each country.

However, comparing improvements in model fit does not directly assess the relationship between the different dimensions. Where the improvement in fit moving to a three-factor solution is greatest, it follows that the three dimensions are more distinct from one another. Given that the three-factor solution is a better fit than a one- or two-factor solution in all cases, we must develop a method for distinguishing between these countries; not all three-dimensional solutions are the same. In order to do this, we must consider the correlations between the three latent dimensions derived from the CFA estimates. By allowing the latent factors to be related in the model, we recover estimates of the correlations between the dimensions. With these estimates, we can easily compute the average correlation between the three dimensions implied by the models.

Table 2. Model fit comparison between one-, two-, and three-factor models

Country	AIC 1 factor	AIC 2 factor	AIC 3 factor	BIC 1 factor	BIC 2 factor	BIC 3 factor
Austria	3418.56	3397.92	*2717.31*	3534.29	3515.79	*2813.58*
Belgium	4942.35	4865.00	*4821.75*	5069.62	5004.05	*4956.09*
Bulgaria	4837.49	4891.17	*4714.59*	4968.76	5022.44	*4853.15*
Czech	2426.60	2374.25	*2337.30*	2528.76	2478.29	*2445.13*
Denmark	3404.69	3239.55	*3163.79*	3527.63	3364.76	*3293.56*
Estonia	1557.90	1551.53	*1521.17*	1633.57	1628.59	*1601.03*
Finland	5076.89	4954.45	*4801.03*	5210.67	5090.70	*4942.23*
France	3654.61	3587.82	*3482.39*	3774.53	3707.74	*3611.36*
Germany	3393.24	3363.84	*3218.44*	3509.29	3484.27	*3343.25*
Greece	3180.20	3133.60	*2997.81*	3282.59	3235.99	*3107.93*
Hungary	1389.74	1365.92	*1351.65*	1463.57	1441.12	*1429.58*
Ireland	3582.82	3551.57	*3487.57*	3695.92	3666.76	*3606.95*
Italy	6300.93	6175.50	*6075.16*	6454.94	6332.37	*6237.73*
Lativa	2586.18	2552.58	*2526.40*	2671.69	2639.68	*2616.66*
Lithuania	2369.66	2357.16	*2310.93*	2479.03	2468.55	*2426.37*
Netherlands	3389.98	3345.68	*3195.89*	3517.24	3475.30	*3330.22*
Poland	2595.66	2597.05	*2546.31*	2704.06	2707.46	*2660.73*
Portugal	3075.99	3039.33	*3020.17*	3179.23	3144.50	*3129.16*
Romania	3776.59	3766.26	*3712.55*	3895.64	3887.52	*3838.22*
Slovakia	6828.46	6760.14	*6521.08*	6973.80	6908.16	*6674.48*
Slovenia	2723.19	2597.04	*2550.16*	2817.03	2692.62	*2649.21*
Spain	6272.65	6264.55	*6238.65*	6424.51	6419.22	*6398.94*
Sweden	4706.82	4671.37	*4582.21*	4835.45	4802.38	*4717.98*
UK	3418.56	3397.92	*3388.09*	3534.29	3515.79	*3510.25*

Note: The cells in italics represent the model that best fits according to the criteria (Akaike information criterion [AIC] or Bayesian information criterion [BIC]).

The resulting measure, the mean of the correlations between the economic left/right, social left/right, and European integration dimensions, provides us more insight into the shape of a given political space than knowing only how many dimensions can be recovered. The higher the average correlation between these three factors, the simpler the dimensional space. In the United Kingdom, for example, the average correlation of the three latent dimensions is 0.86, suggesting that in this country expert placements of parties on economic left/right, social left/right, and EU are highly interrelated. In other words, UK parties compete in a less complex political space. In Slovenia, however, the average correlation is only 0.23, which indicates that the expert perceptions of party placements on these

three dimensions are much more distinct from one another in this country. Figure 4 graphically displays these correlations.

The difference between the average correlation of the three indicators in the United Kingdom and Slovenia presents evidence that the relationships between these dimensions vary substantially across Europe. In Figure 5, we map this geographic variation using GIS data collected from the European Union.[8]

In Figure 5, the darker shades reflect higher correlations between the three latent dimensions. The United Kingdom and Ireland, for instance, are in the highest group, which reflects the relatively high correlations and, therefore, low dimensional complexity. Greece, Latvia, and Estonia, on the other hand, have the lightest shade, reflecting the low correlations between the three indicators and, therefore, relatively greater dimensional complexity. The simple map demonstrates that the average correlations, or dimensional complexity, do not yield straightforward clustering of countries (East vs. West, North vs. South, etc.).

Previous scholarship estimating the dimensionality of party systems has explored the relationship between the effective number of parties and the dimensionality of a given party system (Taagepera and Shugart, 1989; Lijphart, 1999; Taagepera, 1999; Stoll, 2010, 2011). Broadly speaking, the data have supported the hypothesis that more parties are associated with greater dimensionality.[9] In order to assess the face validity of our measure of dimensional complexity, we compare our new measure to both the electoral and legislative effective number of parties in a given country. Figure 6 presents the scatterplots between dimensional complexity and the effective number of parties, both electoral and legislative, for the 24
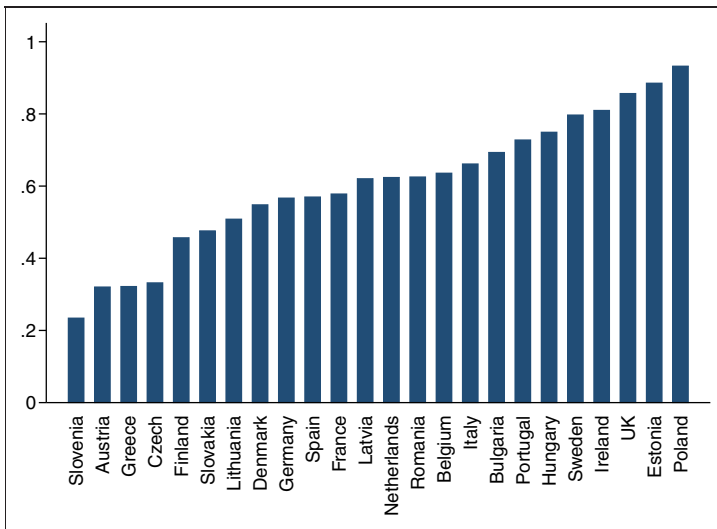

Figure 4. Average inter-item correlations.

countries in our study. With the exception of a few outlying cases (Austria, Czech Republic, Greece, and Slovenia), the Lijphart pattern holds true. In countries such as the UK and Poland, where the average correlation between the three CFA factors is high, there are fewer parties. In countries such as Finland and Lithuania, the correlations are low (i.e. the complexity is high) and there are more parties.

However, while the best fit line shows a relationship in the predicted direction, it is apparent that there is much variation in correlations between the latent dimensions left to explain. Effective number of parties, by itself, provides an inadequate explanation of the dimensional complexity.

This brief discussion has certainly not provided an exhaustive investigation of the explanation of the differences in the correlations of latent dimensions country to country. It has, however, provided some evidence that neither a coarse distinction between East and West nor the effective number of parties adequately explains this variation. In the final section, we summarize our findings and speculate on productive avenues for future research.

Discussion

This article set out to uncover the number of latent dimensions present in each country, and explore the degree to which these dimensions are related to one another in these data. Using the CHES data, we find that a three-factor solution
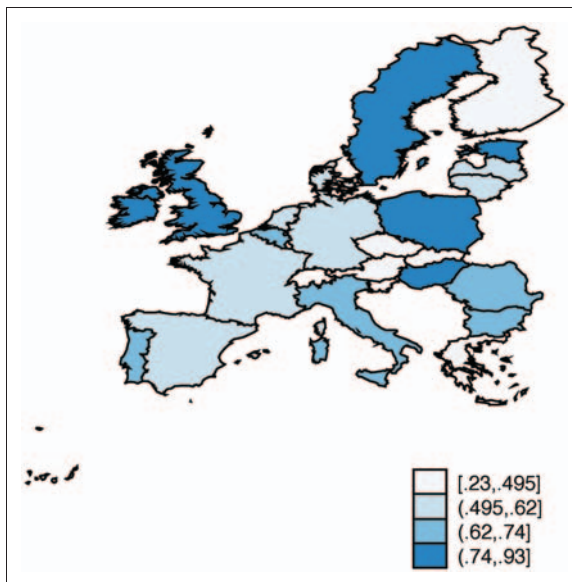

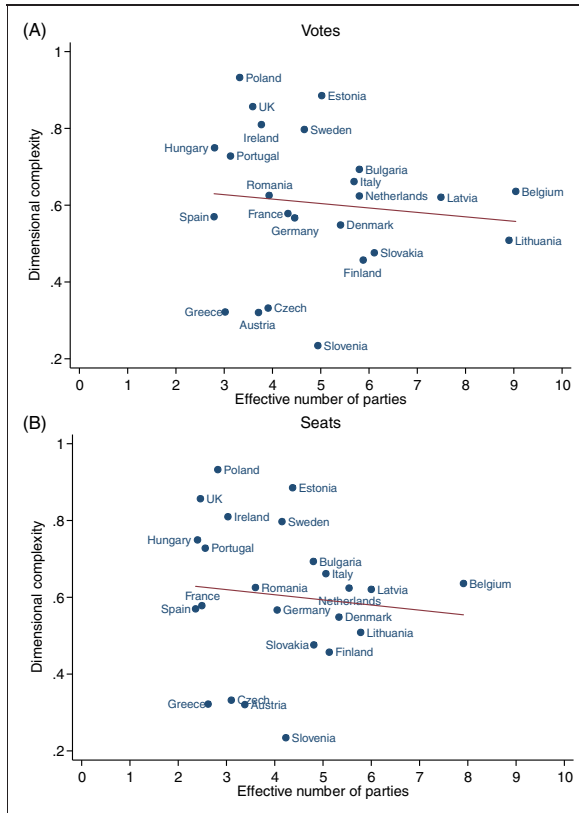**Figure 5.** Geography of dimensional complexity.

Figure 6. Dimensional complexity and the effective number of parties.

is the best fit in all countries; however, the dimensions are much more interrelated in some countries than in others. We demonstrate that these three latent dimensions are distinct from one another, albeit to varying degrees. The extent to which the economic left/right, social left/right, and EU dimensions are correlated reflects the relative complexity of the dimensional space in a given country. None of the countries studied are strictly unidimensional; however, several countries, such as the UK and Poland, have simpler dimensional spaces with far higher correlations between the different latent dimensions (i.e. in some countries, economic and social left/right are virtually indistinguishable from one another). In other countries, a more complex dimensional space emerges. The results demonstrate that not only the relationship between economic left/right and social left/right, but also the EU dimension's relationship with both economic and social left/right varies greatly across space, according to the party experts.

   With this analysis, we hope to convince students of European politics that a different conception of dimensionality can improve our understanding of the shape of political spaces. Even in a data collection project designed to uncover three

distinct dimensions, such as the CHES, our analysis finds that the positioning of parties on these various dimensions, as measured by experts, are interrelated to varying degrees in a wide variety of national contexts. This offers qualified support for scholars such as Kitschelt (1994), Hooghe et al. (2002), and Marks et al. (2006), who have previously argued for the interrelated nature of these dimensions in European political party positioning. Our research expands on this line of scholarship by isolating and highlighting the extent of variation in the degree to which the dimensions are connected to one another across European states.

To the best of our knowledge, the present article is the first systematic test of whether a one-, two-, or three-factor solution best identifies the policy positioning of political parties in Europe. This analysis advances our understanding of dimensionality in Europe in at least two additional ways. First, it explores and reports on the nature of dimensionality in a new data source, the CHES. Second, we report our findings in a way that reorients our investigation of dimensionality from an emphasis on the presence or lack of distinct dimensions to an exploration of just how interrelated these dimensions are in various countries.

Our analysis highlights the stark contrast in the levels of dimensional complexity across the various EU member states, stressing the importance of disaggregating the analysis in a way that accounts for country-specific variation. Moving forward, scholars should attempt to explain the variation in dimensional complexity uncovered in this article. For instance, why is dimensionality low in some countries as apparently disparate as the UK and Poland but high in Austria and Latvia? That some Eastern and Western European party systems display high levels of dimensionality while the party systems of other new and old member states have lower levels of dimensionality suggests that relatively simple distinctions between EU 15 and CEE member states will be inadequate explanations of the variation we find.

Although the effective number of parties and simple East/West distinctions appear insufficient for explaining patterns of dimensionality, the changing socioeconomic structure of society and the volatility of party systems in the Central and East European countries may prove more helpful. Similar to De Vries and Marks (2012), we expect that sociological and strategic approaches will be productive in generating competitive hypotheses to explain the ebbs and flows of these patterns of dimensionality. We hope to connect the present work on the complexity of dimensional space for political parties with research on mass opinion in an effort to understand what role issue entrepreneurs play in the success or failure of attempts to graft new issues onto older dimensions of competition by established parties (see e.g. De Vries and Hobolt, 2012).

Conceptualizing dimensionality as the complexity of a political space, rather than the number of dimensions which compose a political space, more accurately reflects the behaviour of political parties in Europe, as measured by experts. The measure of dimensional complexity developed in this article offers opportunities to test hypotheses geared toward explaining variation in the relevant cleavages of political competition in Europe.

Notes

1. This second dimension goes by many names, including materialist/post-materialist (Inglehart, 1990), left-libertarian/right-authoritarian (Kitschelt, 1994), green-alternative-libertarian/traditional-authoritarian-nationalist (GAL/TAN) (Hooghe et al., 2002), or simply by new politics (Franklin, 1992). In this paper, we simplify matters by labelling this second dimension social left/right.

2. Certainly, arguments over the number of dimensions in American politics continues (Aldrich et al., 2007), but Poole and Rosenthal (1997) is the starting point. They admit two dimensions are significant in certain eras, but find the first dimension to 'dwarf' the second even in those eras (Poole and Rosenthal, 1997: 54). This finding carries over to the European Parliament, where Hix et al. (2006: 495) also find that a single dimension of politics dominates other latent dimensions. A second dimension, pro-/anti-EU, emerges from the roll call vote analysis but is far weaker.

3. Even when they consider multiple dimensions (Adams et al., 2005: 77), as they do in France, the ordering of parties hardly varies across left/right, immigration, public sector, and church schools (Chirac is slightly to the right of Le Pen on public sector and church schools). This stable ordering implies that there is considerable packaging of issues into a small number of dimensions.

4. The multiple dimensions could be related with each other. For instance, Marks et al. (2006) argue that the relationship between the left/right position of European political parties and the position of these parties on European integration is an inverted U shape. To continue the example, some aspects of European integration might be subsumed in the left/right dimension, making it appear unidimensional, but other facets of integration bring forth a pro-/anti-integration dimension distinct from left/right (Hooghe and Marks, 1999, 2001).

5. See the web appendix for a list of the policy questions, grouped under economic left/right, social left/right, and EU integration.

6. For robustness, we also analysed the survey data using exploratory factor analysis. Although we consistently find one dominant factor, we find three factors that meet conventional criteria (eigenvalue greater than 1) emerge for all countries, with the exception of the United Kingdom and Poland where only two factors that meet this criterion emerge from the exploratory factor analysis. Significantly, though, exploratory factor analysis yields results that are difficult, if not impossible, to interpret substantively because the factors that emerge are amalgamations of all three concepts, conditional on how related the dimensions are.

7. We also estimated the models assuming categorical, rather than continuous, indicators and the results were substantively identical.

8. We collected the NUTS geo-datafiles from *GISCO NUTS 2006*, made available by Eurostat at: http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/. We created the maps in *Stata* 11 using the spmap command.

9. Arguably, the causal arrows in this relationship could go in both directions.

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Appendix. Political parties in a two-dimensional space

(M) Italy

(N) Latvia

(O) Lithuania

(P) Netherlands

(Q) Poland

(R) Portugal

(S) Romania

(T) Slovakia

(U) Slovenia

(V) Spain

(W) Sweden

(X) UK